GZP6897D

Type of pressure sensor

Digital output

Lead-free products

Product Specifications

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Revision	describe	date
V1.0	Initial version	2020.03.22
V1.1	1. Improve product information 2. Add a reference routine 3. Modify the selection table	October 10, 2020
V1.2	Modify some parameters	2021.04.30
V1.3	1. Revise the selection guide 2. Add cover and table of contents.	2021.09.02
V1.4	Adjust product classification	2022.03.16

The company reserves the right to change the specifications included therein without prior notice.

1. Product Features

- Measurement range: -100kPa...0kPa～0.5kPa...200kPa
- Differential pressure type
- Air valve with anti-detachment structure
- Suitable for non-corrosive gases
- Power supply voltage: 2.5V～5.5V
- IIC Communications
- The maximum pressure at the low-pressure end is 250 kPa.

2. Application Areas

- Medical fields such as ventilators, spirometers, negative pressure wound therapy, blood pressure monitoring, and sleep apnea treatment.
- Industrial applications include airflow detection, heating, ventilation and air conditioning, pneumatic equipment, and pressure switches.
- Bioscience, small home appliances, consumer electronics, sports and fitness equipment, fire-fighting equipment, Internet of Things and other fields
- Gas flow meters, gas emissions, variable air volume control, and other fields

3. Product Overview

The GZP6897D differential pressure sensor is a pressure sensor suitable for differential pressure measurement. Its core component is a...

A silicon piezoresistive pressure-sensitive chip fabricated using MEMS technology, wherein the front and back sides of the pressure-sensitive chip are connected by leads.

The nozzle senses different pressures, creating a pressure difference and generating an electrical signal proportional to that pressure difference. It also features a built-in high-precision...

The temperature conditioning chip digitally compensates for sensor offset, sensitivity, temperature drift, and nonlinearity, using the supply voltage as a reference.

It generates a calibrated, temperature-compensated digital signal (IIC).

The gas nozzle of the GZP6897D differential pressure sensor has an anti-detachment structure, making it less prone to air leakage.

4. Performance Indicators

Power supply: (5±0.25)V DC

Reference temperature: 25℃

Table 1. Performance Indicators

project	numerical values	unit
Precision*	±1	%Span
Response time	2.5ms@OSR_P=1024X	ms
SDA/SCL pull-up resistors	4.7	K ohm
ESD HBM	4000	V
Zero-point temperature drift	±0.03	%FS/℃
Full-range temperature drift	±0.03	%FS/℃
High-voltage end overload pressure	4× (range ⩽ 40 kPa)	Rated
	2× (range > 40 kPa)	
High-pressure end failure pressure	5× (range ⩽ 40 kPa)	
	3× (range > 40 kPa)	
Compensation temperature	0～60 (customizable)	℃
Operating temperature	- 20～100	℃
Storage temperature	- 30～150	℃

* The output error within the accuracy range of 0 to 70°C is composed of the linearity, repeatability, and hysteresis of the pressure. The accuracy varies depending on the pressure range. Please consult customer service for more details.

5. Electrical characteristics

Table 2. Electrical Characteristics

parameter	Minimum value	Typical value	Maximum value	unit	Remark
Power supply voltage	2.5		5.5	V	
standby current		100		nA	
Current consumption		5		uA	One measurement
LDO output*	1.62	1.8	1.98	V	3.3V power supply
	3.24	3.6	3.96	V	5V power supply
PSRR		60		dB	
resolution		twenty four		Bits	
Output data resolution	twenty four			Bits	LSB=(1/2^23)*VEXT
Built-in temperature sensor Accuracy			±0.5	℃	@25℃
			±1	℃	- 40 to 85 ℃
Output data resolution	16			Bit	LSB = (1/256) ℃
Clock pulse frequency			400	KHz	I2C communication

* To obtain the best measurement accuracy, ensure that the supply voltage is higher than that of the LDO.

6. External structure(Unit: millimeters)

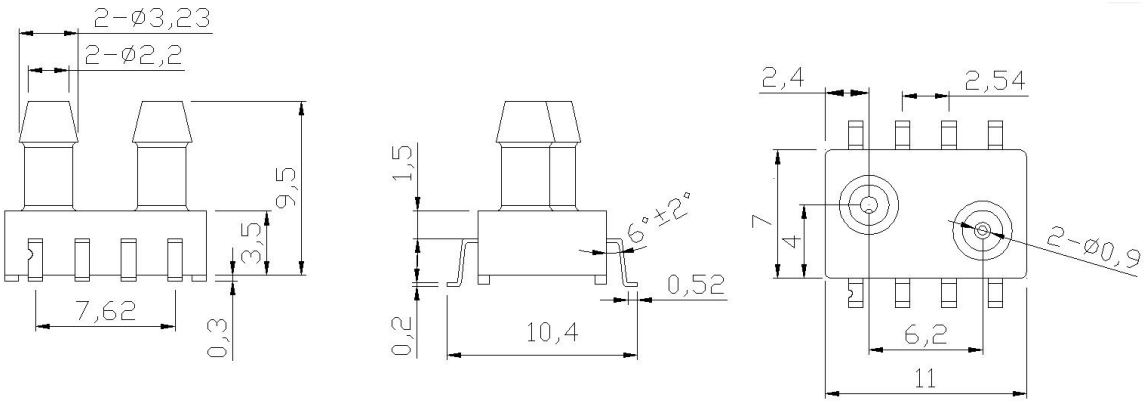

Figure 1. External structure

7. Electrical Connections

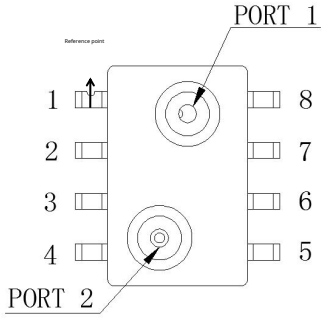

Table 3. Pin Correspondence

1	2	3	4	5	6	7	8
N/C	Vdd	N/C	N/C	N/C	SDA	SCL	GND

Notice:

1. Please confirm the electrical definitions before assembly.

2. Do not have any electrical connection to the NC pin, otherwise it may cause the product to malfunction.

3. PORT 1 is the high-pressure chamber, and PORT 2 is the low-pressure chamber.

4. Take proper anti-static protection measures during the welding process.

5. Overload voltage (6.5Vdc) may burn out circuit chips.

6. Please add a 0.1uF capacitor between VDD and GND.

7. This product does not have reverse connection protection; please pay attention to the power polarity during assembly.

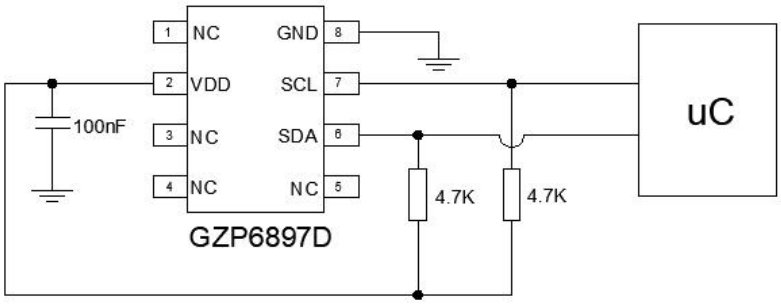

Figure 2. Typical Applications

8.I₂C communication protocol

I₂The C bus uses SCL and SDA as signal lines, both of which are connected via pull-up resistors (typically 4.7K).

When connected to VDD, it remains at a high level when not communicating.

I₂Device C has the address 0x6D.

-I₂Table 4.1 shows the electrical characteristics of the C

communication pins.₂Electrical characteristics of C communication pins

Marking	parameter	condition	Minimum value	Maximum value	unit
f_{scl}	clock frequency			400	KHz
t_{LOW}	Clock low pulse duration		1.3		us
t_{HIGH}	Clock high pulse duration		0.6		us
t_{SUDAT}	SDA establishment time		0.1		us
t_{HDDAT}	SDA Hold Time		0.0		us
t_{SUSTA}	Creation time at each start		0.6		us
t_{HDSTA}	Start condition duration		0.6		us
t_{SUSTO}	Stop condition establishment time		0.6		us
t_{BUF}	Interval between two communications		1.3		us

-I ₂C. Timing Diagram

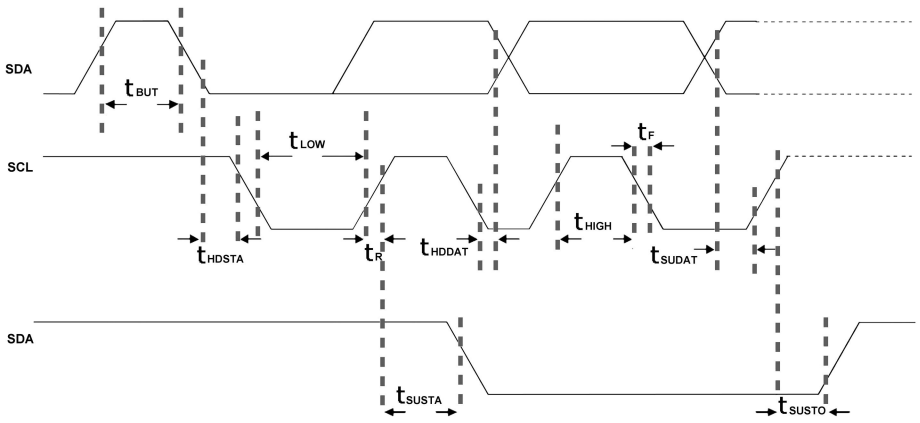

Figure 3. I ₂C. Timing Diagram

IThe C communication protocol has specific start (S) and stop (P) conditions. When SCL is high, SDA...

A falling edge indicates the start of data transmission. ₂C. The master device sequentially sends the slave device's address (7 bits) and read/write control bits. When

After the device recognizes this address, it generates an acknowledge signal and pulls SDA low during the ninth cycle. This allows it to receive the signal from the device.

After receiving the response, the master device continues to send the 8-bit register address. Upon receiving the response, it continues to send or read data. (SCL)

At a high level, SDA generates a rising edge to activate flag I.₂C communication ends. Besides start and end markers, when...

When SCL is high, the data transmitted by SDA must remain stable. When SCL is low, the value transmitted by SDA can change. ₂C

All data transmissions in communication are based on 8-bit units, with an acknowledgment signal required after every 8 bits of data transmission to ensure data integrity.

Continue transmitting.

-I₂C Protocol

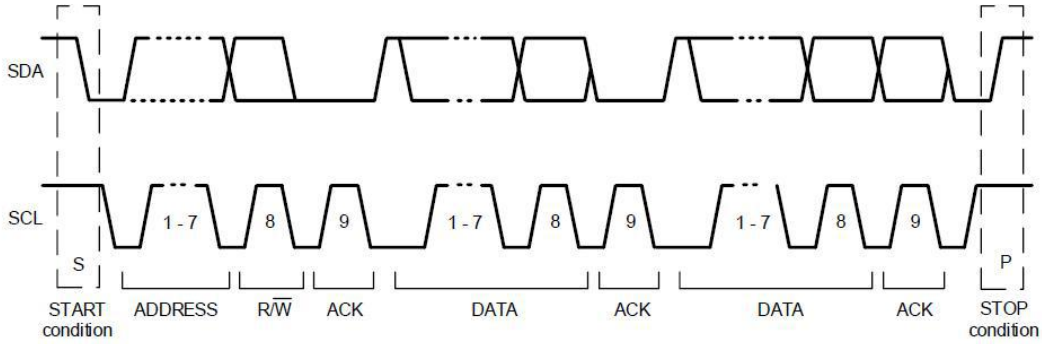

Figure 4. I ₂C Protocol

9. Register Description

Table 5. Register Descriptions

address	describe	R/W	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0	default value
0x06	DATA_MSB	R	Data out<23:16>								0x00
0x07	DATA_CSB	R	Data out<15:8>								0x00
0x08	DATA_LSB	R	Data out<7:0>								0x00
0x09	TEMP_MSB	R	Temp out<15:8>								0x00
0x0A	TEMP_LSB	R	Temp out<7:0>								0x00
0x30	CMD	RW	Sleep_time<7:4>				SCO	Measurement_ctrl<2:0>			0x00
0xA5	Sys_config	RW	Aout_config<7:4>				LDO_config	Unipolar	Data_out_control	Diag_on	OTP
0xA6	P_config	RW		Input Swap	Gain_P<5:3>			OSR_P<2:0>			OTP

Reg0x06-Reg0x08

Pressure Data Register

Reg0x09-Reg0x0A

Temperature data register

Reg0x30 (Measurement Command Register)

Measurement_control<2:0> (Working Mode)

000, Single temperature acquisition mode.

001, Single sensor pressure signal acquisition mode. (Temperature needs to be read before using this mode to obtain...)

Use the temperature calibration coefficient; otherwise, the readings will be inaccurate.

010, Combined acquisition mode (a sensor pressure signal is acquired immediately after a temperature acquisition).

011, Sleep mode (performs a combined data acquisition mode periodically, with the interval determined by 'sleep_time').

Certainly)

Sleep_time<7:4>: 0001:62.5ms, 0010:125ms ... 1111: 1s, 0000: Meaningless. (Only during sleep)

(Effective in working mode)

Sco: Data acquisition complete flag. 1, data acquisition begins; 0, acquisition ends (except in sleep mode).

Reg0xA5

Aout_config<7:4>: Simulated output configuration (it is recommended to keep the default configuration).

LDO_config: Internal LDO configuration. 0 configures to 1.8V; 1 configures to 3.6V.

Unipolar: 0, ADC raw data is output in signed number format; 1, ADC raw data is output in unsigned format.

Formatted output. (Only valid if 'Data_out_control'=1)

Data_out_control: 0 outputs calibration data; 1 outputs raw ADC data (default is 0).

Diag_on: 0, disables diagnostics; 1, enables diagnostics (enabled by default).

Reg0xA6

Input Swap: Swaps the polarity of the differential signal inside the sensor.

Gain_P<5:3>: PGA gain when acquiring sensor signals, 000: Gain = 1X. 001: Gain = 2X. 010: Gain = 4X. 011: Gain = 8X. 100: Gain = 16X. 101: Gain = 32X. 110: Gain = 64X. 111: Gain = 128X.

OSR_P<2:0>: Oversampling during sensor signal acquisition, 000: 1024X, 001: 2048X, 010: 4096X, 011:8192X,100:256X, 101:512X, 110:16384X, 111:32768X.

10. Working Mode Description:

10.1 Combined Data Acquisition Mode

Set 'measurement_control'=010 and 'sco'=1 to enter the combined data acquisition mode.

After power-on, the chip performs one temperature data acquisition and one sensor data acquisition, and then returns to standby mode.

The formula will automatically set 'sco' to 0. In combined acquisition mode, the "Data_out_control" register must be set to 0, and the calibration will be performed.

The temperature data after calibration is stored in registers 0x09~0x0A, and the pressure data is stored in registers 0x06~0x08.

10.2. Sleep Data Acquisition Mode

Setting 'measurement_control'=011 and 'sco'=1 enters sleep data acquisition mode. After the chip powers on, it...

Temperature data and sensor data are collected at regular intervals, the interval being determined by 'sleep_time'.

The settings range from 62.5ms to 1s. Data acquisition will not stop unless 'sco' is manually set to 0. Data acquisition during sleep mode.

In this mode, 'Data_out_control' must be set to 0, and the calibrated temperature data is stored in registers 0x09~0x0A.

Pressure data is stored in registers 0x06 to 0x08.

-The combined mode reads data according to the following instruction sequence:

1) Send instruction 0x0A to register 0x30 to perform one temperature acquisition and one pressure data acquisition.

2) Read register address 0x30. If the Sco bit is 0, it indicates the acquisition is complete, and data can be read. Or wait.

Delay 10ms.

3) Read the data from the three register addresses 0x06, 0x07, and 0x08 to construct a 24-bit AD value (pressure data AD).

The value is obtained by reading the data from registers 0x09 and 0x0A to construct a 16-bit AD value (temperature data AD value).

4) Convert the pressure and temperature values using the following formula:

• A "0" at the highest bit indicates positive pressure/positive temperature:

Pressure = Pressure - ADC /k;

Temperature=Temperature_ ADC/256;

• A "1" at the highest bit indicates negative pressure/negative temperature:

Pressure=（pressure_ADC-16777216）/k;

Temperature=（Temperature_ADC-65536）/256;

Note: 1) The output after sensor calibration can be regarded as the current actual pressure value (±1% Span).

2) Sensor calibration output: Unit Pa (default). To display other units, please refer to the conversion formula.

Input the corresponding coefficients into the formula for conversion;

3) The selection of the k value in the above pressure ADC conversion formula can be found in the table below:

Table 6. Comparison of the maximum measurement point P and the coefficient k value

Maximum measurement point P value range	k value
131＜P≤262	32
65＜P≤131	64
32＜P≤65	128
16＜P≤32	256
8 < P ≤ 16	512
4≤P≤8	1024
2≤P＜4	2048
1≤P＜2	4096
P < 1	8192

P is taken as the maximum absolute value of the measurement point. For example, when measuring -20 to 40 kPa, P is taken as 40, because 32 < 40 ≤ 65.

Therefore, the value of k is 128; for example, in a measurement range of -100 to 50 kPa, P is taken as 100, because 65 < P ≤ 131, so k

The value is 64.

11. Selection Guide

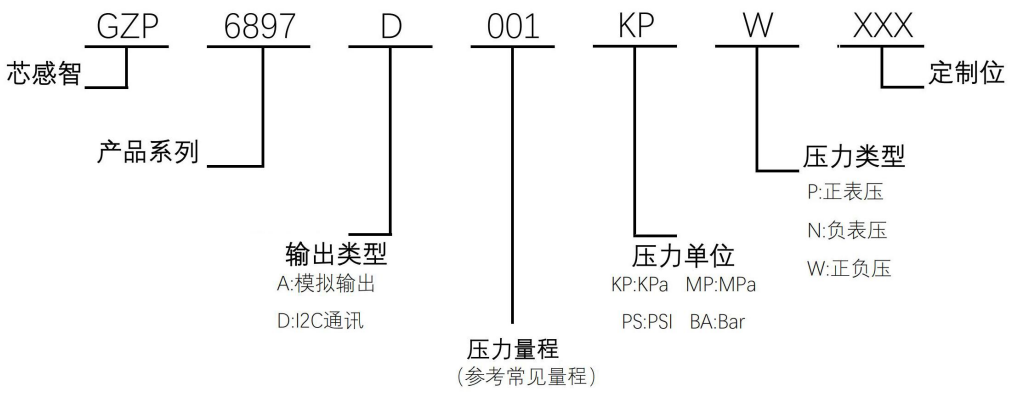

Figure 5. Selection Guide

12. Commonly Used Measuring Ranges

Table 7. Commonly Used Measurement Ranges

Pressure range(kPa))	**Pressure range**(Other units)	**model**
- 0.5 ~ 0.5	-5～5mbar / -500～500Pa	GZP6897D0.5KPW
- 1 ~ 1	-10～10mbar / -100～100mmH_2O	GZP6897D001KPW
- 2.5 ~ 2.5	-25～25mbar / -250～250mmH_2O	GZP6897D2.5KPW
- 5 ~ 5	-50～50mbar / -500～500mmH_2O	GZP6897D005KPW
- 40 ~ 40	-400～400mbar / -300～300mmHg	GZP6897D040KPW
- 100 ~ 100	- 1～1 bar / -14.5～14.5 PSI	GZP6897D101KPW
- 100 ~ 0	-1～0 bar / -14.5～0 PSI	GZP6897D101KPN
0 ~ 1	0～10mbar / 0～100mmH_2O	GZP6897D001KPP
0 ~ 2.5	0～25mbar / 0～250mmH_2O	GZP6897D2.5KPP
0 ~ 5	0～50mbar / 0～500mmH_2O	GZP6897D005KPP
0 ~ 10	0～100mbar / 0～75mmHg	GZP6897D010KPP
0 ~ 20	0～200mbar / 0～150mmHg	GZP6897D020KPP
0 ~ 50	0～500mbar / 0～375mmHg	GZP6897D050KPP
0 ~ 100	0～1 bar / 0～14.5 PSI	GZP6897D101KPP
0 ~ 200	0～2 bar / 0～29 PSI	GZP6897D201KPP
Various ranges and parameters can be customized as needed.		

13. Selection Tips

1. When selecting a product, please ensure that the medium being tested is compatible with the parts of the product that come into contact with the medium.

2. If you have any special requirements for the product's performance parameters and functions, please consult with our company.

14. Precautions for use

14.1. Welding

Because this product has a small, compact design with a low heat capacity, please minimize the impact of external heat. No.

This may cause damage due to heat deformation, leading to changes in properties. Please use a non-corrosive rosin-based flux. Additionally,

Because the product is exposed, please take care not to allow flux to seep inside. 1)

Manual soldering

• Please use a soldering iron with a head temperature of 260-300℃ (30W) to perform the operation within 5 seconds.

• When soldering with a load applied to the terminals, the output may change, so please be aware of this.

• Please keep the soldering iron tip clean.

2) DIP soldering (DIP terminal type)

• Perform the operation within 5 seconds in a DIP solder bath at a temperature below 260 ℃.

• When mounting on a substrate with low heat capacity, avoid using DIP soldering as thermal deformation may occur.

3) Reflow soldering (SMD terminal type)

Recommended reflux furnace temperature settings are as follows:

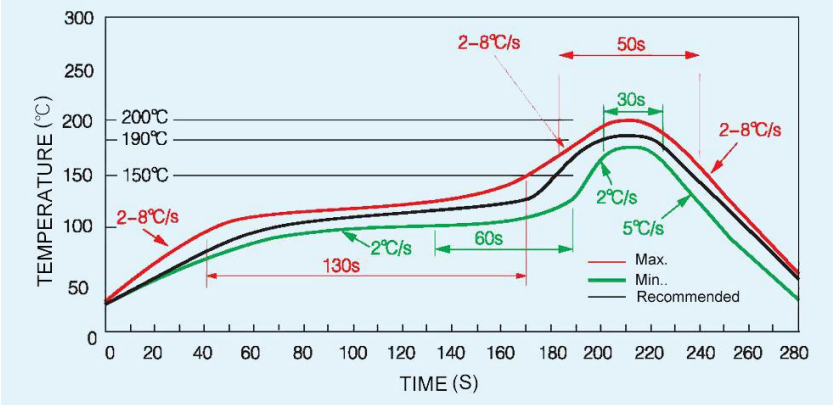

Figure 6. Reflow soldering

• Please refer to the recommended PCB layout diagram for the routing of the printed circuit board.

• Since self-calibration is not possible, please carefully align the terminals and traces.

• The temperature is set to the value measured on the printed circuit board near the terminal.

Due to factors such as the equipment and conditions, the tip of the pressure inlet may melt and deform at high temperatures. Please ensure it is properly sealed.

Under actual mounting conditions, validation tests were conducted.

4) Repair of welded parts

Please complete the corrections in one go.

• When correcting solder joints, use a soldering iron with a smooth tip and do not apply additional flux.

• Regarding the temperature of the soldering iron tip, please use a soldering iron with a temperature below that specified in the datasheet.

5) Applying excessive force to the terminals can cause deformation and impair solderability. Therefore, please avoid dropping the product.

It involves complex usage.

6) The warpage of the printed circuit board relative to the entire sensor should be kept below 0.05mm. Please manage this.

7) When cutting and bending the substrate after installing the sensor, please be careful not to cause stress on the welded parts.

8) Because the sensor terminals are exposed, touching the terminals with metal objects or other contact materials may cause output abnormalities. Please note.

Avoid touching it with metal pieces or your hands.

9) When applying a coating after soldering to prevent the substrate insulation from deteriorating, be careful not to let any chemicals adhere to the sensor.

14.2. Cleaning Requirements

1) As the product is an open type, please be careful not to let the cleaning solution enter the interior.

2) Ultrasonic cleaning may cause product malfunction, so please avoid using ultrasonic cleaning.

14.3. Storage and Transportation

1) This product is not drip-proof, so please do not use it in places where water may splash on it.

2) Do not use in environments prone to condensation. Additionally, moisture adhering to the sensor chip may freeze and cause condensation.

This can cause changes or damage to the sensor output.

3) The output of a pressure sensor chip changes when exposed to light, especially when exposed to light through transparent sleeves, etc.

When applying pressure, please avoid exposing the sensor chip to light.

4) Pressure sensors in standard packaging can be transported using ordinary conveyor systems. Please note: Protect the product from damage during transportation.

Protects against moisture, impact, sunburn, and stress.

14.4. Other usage precautions

1) Incorrect installation may cause accidents, so please be careful.

2) Please avoid using methods that apply high-frequency vibrations, such as ultrasonic waves.

3) The only pressurized medium that can be used directly is dry air. Other media, especially corrosive gases (with...

When used in media containing organic solvent gases, sulfurous acid gases, hydrogen sulfide gases, etc., or media containing moisture or foreign matter, it can cause...

Malfunctions and damage may occur, so please avoid using it in the above-mentioned environments.

4) The pressure inlet is equipped with a pressure sensor chip. Inserting foreign objects such as needles into the pressure inlet will cause...

The chip may be damaged or the inlet may be blocked, so please absolutely avoid the above operations. Additionally, please avoid blocking the air inlet during use.

mouth.

5) Regarding operating pressure, please use within the rated pressure range. Using outside the range will cause damage.

6) Please take precautions when using this product as static electricity may cause damage.

Please ground any live objects on the table and the operator to ensure the safe discharge of static electricity in the surrounding area.

7) Depending on the pressure applied, please pay close attention to the securing of the product and the sleeve, as well as the securing and selection of the inlet tube. Additionally,

Please feel free to contact us if you have any questions.

■ Please confirm under actual usage conditions.

Since this specification pertains to a single product, to improve reliability during actual use, please confirm the actual usage conditions.

Performance and quality.

15. Packaging Information

Material tube information (unit: millimeters)

Quantity per tube: 45 pieces

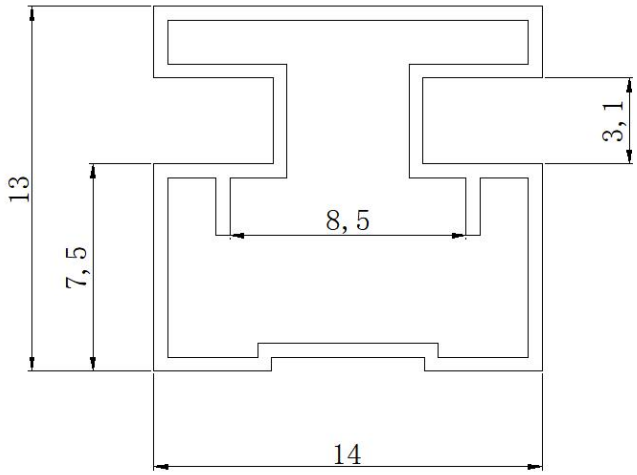

Figure 7. Schematic diagram of the cross-section of the feed tube.

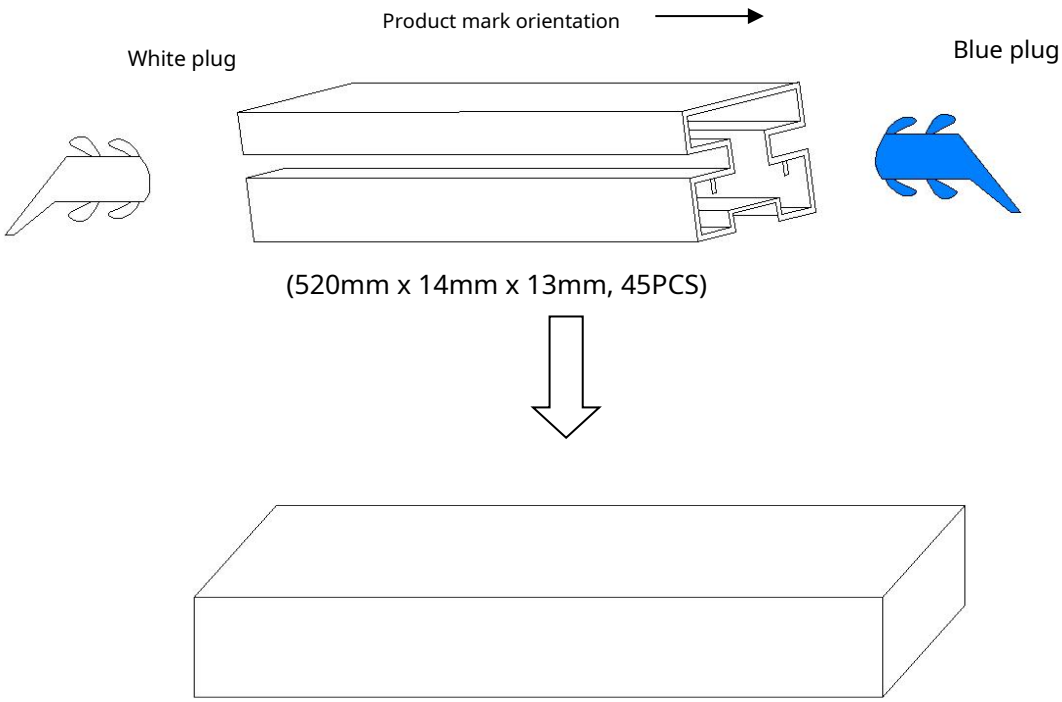

Figure 8.Packaging illustration

Safety Precautions

This product is a semiconductor component used in general electronic devices (communication equipment, measuring equipment, machine tools, etc.).

Products made using these semiconductor components may malfunction or fail due to external interference and surges.

Therefore, please verify the performance and quality under actual use. As a precaution, please incorporate safety features into the device (such as protection).

The installation of protective circuits such as fuses and circuit breakers, along with the multi-functionality of devices, ensures that even in the event of a malfunction, life will not be endangered.

Your body, property, etc. To prevent injury and accidents, please be sure to observe the following:

- Drive current and voltage should be used below the rated values.
- Please wire according to electrical definitions. Especially avoid reversing the power supply connection, as this may cause overheating, smoke, or fire.

Please be aware that circuit damage can cause accidents.

- Exercise caution when securing the product and connecting the pressure inlet.

IIC Example Code (Attachment: IIC Code Example)

```
#include <reg52.h>
#include <math.h>
#define DELAY_TIME 600
#define TRUE 1
#define FALSE 0
# define uchar unsigned char
# define uint unsigned int

//-----------------define IIC SCL,SDA port-------------------------------

sbit SCL = P1 ^ 7;
sbit SDA = P1 ^ 6;

//-----------------define Max7219 port-----------------------------

sbit Max7219_pinCLK = P2 ^ 2;
sbit Max7219_pinCS = P2 ^ 1;
sbit Max7219_pinDIN = P2 ^ 0;

//-------------delay time_us------------------------------ void DELAY(uint t)

{
      while (t != 0)
            t--;
}

//-------------IIC START CONDITION------------------------------ void
I2C_Start(void)
{
      SDA = 1;                    //SDA output high
      DELAY(DELAY_TIME);
      SCL = 1;
      DELAY(DELAY_TIME);          //SCL output high
      SDA = 0;
      DELAY(DELAY_TIME);
      SCL = 0;
      DELAY(DELAY_TIME);
}

//-------------IIC STOP CONDITION----------------------------------
```

```
void I2C_Stop(void)
{
    SDA = 0;                    //SDA OUTPUT LOW
    DELAY(DELAY_TIME);
    SCL = 1;
    DELAY(DELAY_TIME);
    SDA = 1;
    DELAY(DELAY_TIME);
    SCL = 0;                    //SCL OUTPUT LOW
    DELAY(DELAY_TIME);
}

//-------------IIC SEND DATA "0"------------------------------ void SEND_0(void)

{
    SDA = 0;
    DELAY(DELAY_TIME);
    SCL = 1;
    DELAY(DELAY_TIME);
    SCL = 0;
    DELAY(DELAY_TIME);
}

//-------------IIC SEND DATA "1"------------------------------ void SEND_1(void)

{

    SDA = 1;
    DELAY(DELAY_TIME);
    SCL = 1;
    DELAY(DELAY_TIME);
    SCL = 0;
    DELAY(DELAY_TIME);
}

//-------------Check SLAVE's Acknowledge ------------------------------- bit
Check_Acknowledge(void)
{

    SDA = 1;
    DELAY(DELAY_TIME);
    SCL = 1;
    DELAY(DELAY_TIME / 2);
```

```
    F0 = SDA;
    DELAY(DELAY_TIME / 2);
    SCL = 0;
    DELAY(DELAY_TIME);
    if (F0 == 1)
        return FALSE;
    return TRUE;
}

//-------------Write One Byte of Data ---------------------------- void
WriteI2CByte(uchar b) reentrant
{

    char i;
    for (i = 0; i < 8; i++)
        if ((b << i) & 0x80)
            SEND_1();
        else
            SEND_0();
}

//-------------Read One Byte of Data ------------------------------ uchar
ReadI2CByte(void) reentrant
{

    char b = 0, i;
    for (i = 0; i < 8; i++) {

        SDA = 1;
        DELAY(DELAY_TIME);
        SCL = 1;
        DELAY(DELAY_TIME);
        //DELAY(10);
        F0 = SDA;
        DELAY(DELAY_TIME);
        //DELAY(10);
        SCL = 0;
        if (F0 == 1)
        {
            b = b << 1;
            b = b | 0x01;
        }
        else
```

```
            b = b << 1;
        }
        return b;
}
//-------------write One Byte of Data,Data from MASTER to the SLAVER
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
//-------------SLAVER address bit:01101101---------------------------------- void
Write_One_Byte(uchar addr, uchar thedata)      //Write "thedata" to the SLAVER's address of
"addr"
{
        bit acktemp = 1;
        I2C_Start();                                    //IIC START
        WriteI2CByte(0xDA);                                 //IIC WRITE operation, SLAVER address
bit:01101010
        acktemp = Check_Acknowledge();                //check the SLAVER
        WriteI2CByte(addr); /*address*/
        acktemp = Check_Acknowledge();
        WriteI2CByte(thedata); /*thedata*/
        acktemp = Check_Acknowledge();
        I2C_Stop();                                     //IIC STOP
}

//-------------Reaed One Byte of Data,Data from SLAVER to the MASTER
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
uchar Read_One_Byte(uchar addr)
{
        bit acktemp =
        1;uchar mydata;

        I2C_Start();
        WriteI2CByte(0xDA);
        acktemp = Check_Acknowledge();
        WriteI2CByte(addr);
        acktemp = Check_Acknowledge();
        I2C_Start();
        WriteI2CByte(0xDB);                             //IIC READ operation
        acktemp = Check_Acknowledge();
        mydata = ReadI2CByte();
        acktemp = Check_Acknowledge();
        I2C_Stop();
        return mydata;
}
//-------------Delay_ms --------------------------------
```

```
void Delay_xms(uint x)
{
    uint i, j;
    for (i = 0; i < x; i++)
        for (j = 0; j < 112; j++)
            ;
}

//-------------Write One Byte to the Max7219------------- void
Write_Max7219_byte(uchar DATA)
{
    uchar i;
    Max7219_pinCS = 0;          //CS low effect
    for (i = 8; i >= 1; i--) {

        Max7219_pinCLK = 0;
        Max7219_pinDIN = DATA & 0x80;
        DATA = DATA << 1;
        Max7219_pinCLK = 1;                  //when pinCLK is high send the Data
    }
}
//-------------decide which address shows the Data------------- void
Write_Max7219(uchar address,uchar dat)
{
    Max7219_pinCS = 0;
    Write_Max7219_byte(address);
      Write_Max7219_byte(dat);
    Max7219_pinCS = 1;
}

//-------------MAX_7219 Initialization------------- void
Init_MAX7219(void)
{
    Write_Max7219(0x09, 0xff);       //Decoding method: BCD code
    Write_Max7219(0x0a, 0x03);       //brightness
    Write_Max7219(0x0b, 0x07);       //Scan limit: 8 digital tubes displayed
    Write_Max7219(0x0c, 0x01);       //Power-off mode: 0, Normal mode: 1
    Write_Max7219(0x0f, 0x01);       //Test result: 1; Test complete, normal display: 0
}



void main(void)
{
```

```
uchar yali1, yali2, yali3,wendu1,wendu2;
uchar temp_a5;
long int ad,temp;
long float pas;
uchar dis[8];
Init_MAX7219();
Delay_xms(1000);
Write_Max7219(0x0f, 0x00);
while (1)
{

    temp_a5 = Read_One_Byte(0xA5); //Read ASIC Sys_config (read system configuration value) temp_a5 =
    temp_a5 & 0xFD; //(Raw_data_on: 0: output calibrated data, the output is the calibrated value, that is, the
value in register 0x06-0x0a is the calibration value)
    Write_One_Byte(0xA5, temp_a5); //Set ADC output calibrated data Write_One_Byte(0x30, 0x0A); //indicate a
    combined conversion (once temperature conversion immediately followed by once sensor signal conversion)
(0x30 contains the measurement command: 000: single temperature measurement; 001: single pressure measurement; 010:
combined: single pressure and temperature measurement; 011: sleep mode (executes combined mode measurement at
certain time intervals))
    while ((Read_One_Byte(0x30) & 0x08) > 0); // Judge whether Data collection is
    over.

//-------------READ ADC output Data of Pressure-------------
    yali1 = Read_One_Byte(0x06);
    yali2 = Read_One_Byte(0x07);
    yali3 = Read_One_Byte(0x08);

    ad = yali1 * 65536 + yali2 * 256 + yali3;

//-------------READ ADC output Data of Temperature-------------
    wendu1= Read_One_Byte(0x09);
    wendu2= Read_One_Byte(0x0a);
    temp=wendu1*256+wendu2;

/*Conversion, the following is the conversion formula of 100kpa*/

        if (ad > 8388608)                // Values  exceeding 8388606 are considered negative and require processing on the display terminal.
    {
        pas = (ad - 16777216)/64/1000;          //Unit is kPa
    }
    else
    {
        pas = ad/64/1000;                       //Unit is kPa
```

```
            }
            if (pas < 0)
                pas = fabs(pas);
/*Display program with Max7219*/
            dis[0] = (long int)pas / 10000000;
            dis[1] = (long int)pas % 10000000 / 1000000;
            dis[2] = (long int)pas % 1000000 / 100000;
            dis[3] = (long int)pas % 100000 / 10000; dis[4]
            = (long int)pas % 10000 / 1000; dis[5] = (long
            int)pas % 1000 / 100;
            dis[6] = (long int)pas % 100 / 10;
            dis[7] = (long int)pas % 10;
            Write_Max7219(8, dis[0]);
            Write_Max7219(7, dis[1]);
            Write_Max7219(6, dis[2]);
            Write_Max7219(5, dis[3]);
            Write_Max7219(4, dis[4]);
            Write_Max7219(3, dis[5]);
            Write_Max7219(2, dis[6]);
            Write_Max7219(1, dis[7]);
            Delay_xms(100);                         //delay 100ms
        }
}
```

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